



National Transportation Safety Board Aviation Accident Final Report

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|--------------------------------|---------------------------------------|-------------------------|-------------|
| Location: | KANSAS CITY, MO | Accident Number: | CHI99FA102 |
| Date & Time: | 03/04/1999, 2200 CST | Registration: | N195US |
| Aircraft: | Douglas DC-9-15F | Aircraft Damage: | Substantial |
| Defining Event: | | Injuries: | 2 None |
| Flight Conducted Under: | Part 121: Air Carrier - Non-scheduled | | |

Analysis

The airplane was cleared to land on runway 19R at the Kansas City International Airport. The first officer said that the airplane was on speed and on course for the visual approach. 'The captain had just called the 1,000 feet [above the ground] call when a flock of snow geese suddenly illuminated in our lights, engulfing us from below, flying into us. No birds hit the windshields, but it was immediately apparent they had flown into the engines.' The captain said that he had the airplane, advanced the power on both engines, and ordered the first officer to reset the flaps to 30 degrees, the single- engine flap position. 'The number one engine continued to compressor stall. The number two engine went to a sub-idle run condition.' The captain reduced the power on the number one engine 'enough to lessen the surge/stall condition to a rate of once every two seconds, which allowed just enough thrust to maintain the approach and to lower the vibration. The number one engine continued to compressor stall/surge to touchdown.' The touchdown was normal. Examination of the airplane revealed bird remains and substantial damage to both engines. No other anomalies were found.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: ingestion of birds into both engines, resulting in foreign object damage and the subsequent partial power loss to both engines. A factor relating to this accident was the dark night.

Findings

Occurrence #1: IN FLIGHT COLLISION WITH OBJECT

Phase of Operation: APPROACH

Findings

1. (C) OBJECT - BIRD(S)
2. (F) LIGHT CONDITION - DARK NIGHT

Occurrence #2: LOSS OF ENGINE POWER(PARTIAL) - MECH FAILURE/MALF

Phase of Operation: APPROACH

Findings

3. (C) 2 ENGINES - FOREIGN OBJECT DAMAGE
4. COMPRESSOR ASSEMBLY,STATOR VANE - FOREIGN OBJECT DAMAGE
5. COMPRESSOR ASSEMBLY,BLADE - FRACTURED
6. TURBINE ASSEMBLY,NOZZLE - FOREIGN OBJECT DAMAGE
7. TURBINE ASSEMBLY,TURBINE BLADE - FOREIGN OBJECT DAMAGE

Factual Information

HISTORY OF FLIGHT

On March 4, 1999, at 2200 central standard time, a Douglas DC-9- 15F, N195US, operated by USA Jet Airlines, Incorporated, encountered a flock of large birds, while on final approach for landing at Kansas City International Airport, Kansas City, Missouri. During the encounter, several birds were ingested into both engines, resulting in a severe power loss. The pilot managed to regain enough thrust on one engine to continue the approach and land the airplane without further incident. Night visual meteorological conditions prevailed at the time of the encounter. The flight was being conducted under 14 CFR Part 121, non-scheduled, domestic air cargo service. An IFR flight plan was on file. The captain and first officer reported no injuries. The flight originated at Los Angeles, California, at 1825 pacific standard time (pst), and was en route to Kansas City, Missouri.

In her written statement, the first officer said that she was the flying pilot for this leg of their trip. Kansas City International Airport was conducting visual approaches to runways 19L and 19R. The airplane was cleared to land on runway 19R (10,801 feet by 150 feet, dry concrete). The first officer said that the airplane was on speed and course for the visual approach. "The captain had just called the 1,000 feet [above the ground] call when a flock of snow geese [was] suddenly illuminated in our lights, engulfing us from below, flying into us. No birds hit the windshields, but it was immediately apparent they had flown into the engines." The captain said that he had the airplane and directed the first officer to set the flaps to 30 degrees. The first officer said that she notified the Kansas City Air Traffic Control Tower (ATCT) of the bird strike. "When asked by [the] tower if we wanted to go around, we responded, negative.

The number two engine showed about 30 percent N1. The number one engine, when full thrust [was] applied, responded with fluctuating EPRs (engine pressure ratio gauge indications) and violent vibrations. We were able to land and taxi to the ramp with the thrust from [the] number one engine."

In his written statement, the captain said that on the descent into Kansas City international Airport, they received the current airport Automatic Terminal Information System (ATIS) broadcast. The ATIS information included the note, "migratory bird activity reported in the vicinity of the airport." Descending through 10,000 feet mean sea level (msl), the airplane's ground flood lights were turned on. Descending through 5,000 feet msl, the airplane's landing lights were turned on. The captain said that the first officer was flying the airplane on a 150 degree magnetic heading for the visual approach. The first officer intercepted the localizer inbound course for runway 19R, just inside the final approach fix. Ten miles from the airport, the landing gear was extended and the flaps lowered to 40 degrees. At 1,000 feet above ground level (agl), the captain said he made the call, "on localizer, on glide path, on speed." "At 800 feet agl, we hit with no warning, a large flock of snow geese." The captain said that the airplane was three miles from the runway threshold. "Both engines compressor stalled, and I took control of [the] aircraft." The airspeed decayed and the airplane descended below the glide path. The captain advanced the power on both engines and ordered the flaps reset to 30 degrees, the single-engine flap position. "The number one engine continued to compressor stall. The number two engine went to a sub-idle run condition." The captain said that the number one engine compressor stalled at a rate of a surge/stall per second, and vibrated violently. The number two engine remained at 30 percent N1 with no response to the throttle

position. The captain reduced the power on the number one engine "enough to lessen the surge/stall condition to a rate of once every two seconds, which allowed just enough thrust to maintain the approach and to lower the vibration... The number one engine continued to compressor stall/surge to touchdown." The touchdown was normal.

PERSONNEL INFORMATION

The captain holds an airline transport pilot certificate with single-engine land, multi-engine land, and instrument airplane ratings. The captain reported having over 16,000 total flight hours, and over 10,000 hours in the DC-9. In the 30 days prior to the flight, he had logged 60 hours, all in the DC-9.

USA Jet Airlines, Incorporated, stated the captain underwent a flight proficiency check in the DC-9 on December 19, 1998.

The first officer holds an airline transport pilot certificate with single-engine land, multi-engine land, and instrument airplane ratings. The first officer reported having over 4,000 hours total flight time, and over 400 hours in the DC-9. In the 30 days prior to the flight, she had logged 60 hours, all in the DC-9.

USA Jet Airlines, Incorporated, stated the first officer underwent a flight proficiency check in the DC-9 on August 20, 1998.

AIRCRAFT INFORMATION

The airplane was a Douglas DC-9-15F, N195US, serial number 47017, owned and operated by USA Jet Airlines, Incorporated, of Belleville, Michigan, and was used for commercially transporting manufactured parts for automobiles, and other on-demand cargo.

The airplane had undergone a company continuous airworthiness inspection, "C" check, on February 4, 1999. The total airframe time at the inspection was 68,213.5 hours. The airframe time at the time of the bird encounter was 68,261.2 hours.

The airplane underwent a standard preflight by the crew prior to departing Los Angeles on March 4, 1999.

AIRPORT INFORMATION

Kansas City International Airport (MCI) is located at Latitude 39 degrees, 17.86 minutes north, and Longitude 94 degrees, 42.84 minutes west. The airport center is located approximately 15 miles north-northwest of the Kansas City metropolitan area, and 11 miles due north of the Missouri River. The Missouri River runs west-southwest to east through the north part of the city.

The FAA operates a class B airspace over the airport which extends radially from the airport center, out to 20 nautical miles. Requirements for operating with a mode C transponder extends radially for 30 nautical miles.

Airport Remarks listed for Kansas City International Airport in the Airport/Facilities Directory, North Central U. S., covering Missouri, include an advisory for "Waterfowl on and in vicinity of airport from October 1 to December 15, and April 1 to May 30."

WRECKAGE AND IMPACT INFORMATION

On March 5, 1999, at 0930 cst, Federal Aviation Administration (FAA) inspectors examined

the airplane at Executive Beechcraft, Kansas City International Airport.

The airframe showed no damage. Traces of bird remains were found along the front and top of the left nose gear door, and the left nose gear brace strut.

The left engine (number one engine), serial number 649193, showed traces of bird remains on the nose dome. Traces of bird remains were also observed adhering to the front ring and inside wall of the engine's nose cowl. The inlet guide vanes showed some minor inward denting along the leading edges. All of the first stage compressor fan blades were bent and broken. The second stage compressor fan blades were also bent and broken. Bird remains were observed adhering to the inner wall of the engine's exhaust pipe.

The predominately intact carcass of a large white-feathered bird was found embedded on the inboard inlet guide vanes of the airplane's right engine (number two engine), serial number 654749. Traces of bird remains were observed at the base of the nose dome, next to the bird carcass.

Flight control continuity was confirmed. Examination of the airplane's remaining systems revealed no anomalies.

The engines were retained for further examination.

TESTS AND RESEARCH

The left engine (number one engine), serial number 649193, and the right engine (number two engine), serial number 654749, were shipped to Israel Aircraft Industries (IAI), Bedek Aviation Group, Ben Gurion International Airport, Tel Aviv, Israel, for disassembly, inspection, and repair. Both engines were examined on May 3, 1999. The examination was overseen by the State of Israel, Ministry of Transport, Civil Aviation Administration, at the request of the NTSB.

The examination of the left engine (649193) revealed heavy damage to most of the blades (75 to 100 percent) in the 13 compressor disks, and to stators C2 through C12. The inlet fan case and exit stator vanes were destroyed. Melted metal particles were found sprayed and adhering to the number one turbine disk and nozzle guide vanes, and inside walls of the exhaust case.

The examination of the right engine (654749) revealed moderate damage to all of the blades in the C1 and C2 disks. There was minor damage to the 13th stage compressor disk. No other damage was revealed.

At the request of the NTSB, Geo-Marine, Incorporated, of Panama City, Florida, contractor for the U. S. Air Force's Bird Aircraft Strike Hazard (BASH) program, was asked to assess the level of bird activity in the vicinity of the Kansas City International Airport, on March 4, 1999, around the time of the encounter. Geo-Marine operates the Avian Hazard Advisory System (AHAS), which is designed to track bird migration patterns, in near real time, using next-generation weather radar (NEXRAD) images from the NEXRAD Information Distribution System, and determine if that activity constitutes a hazard to aircraft. NEXRAD Level II archive tapes from the WSR-88D radar, located at Pleasant Hill, Missouri, 30 nautical miles southeast of the Kansas City International Airport, for March 4, 1999, were retrieved and compared with National Weather Service information to determine the likelihood of biological targets in the area during the time when the bird strike occurred. Analysis of the radar display information showed a wide area of returns consistent with a widespread northerly migration of birds. The broad-front nature of the returns indicated a large-scale migration. The overall

density and pattern of targets in the reflectivity image suggested a migration of waterfowl through the area. A report provided by Geo-Marine, Incorporated, is attached as an addendum to this report.

ADDITIONAL INFORMATION

As a result of facts gathered during this investigation, added to findings from other airplane accidents involving encounters with birds, the National Transportation Safety Board put forth the following recommendations:

The FAA evaluate the potential for using Avian Hazard Advisory System (AHAS) technology for bird strike risk reduction in civil aviation, and if found feasible, implement such a system in high-risk areas, such as major hub airports, and along migratory bird routes, nationwide.

In coordination with the U. S. Department of Agriculture, the FAA conduct research to determine the effectiveness and limitations of existing and potential bird hazard reduction technologies.

In consultation with the U. S. Department of Agriculture, the FAA require that wildlife assessments be conducted at all 14 Code of Federal Regulation Part 139 airports where such assessments have not already been conducted.

The FAA require the development of a wildlife management program for all airports determined to need one as the result of the wildlife hazard assessment proposed in the previous recommendation.

The FAA ensure that the wildlife hazard management programs are incorporated into the airport certification manuals and periodically inspect the programs' progress.

The FAA require all airplane and airport operators to report bird strikes.

The FAA contract with an appropriate agency to provide proper identification of bird remains, establish timely procedures for proper bird species identification, and ensure that airport and aircraft maintenance employees are familiar with the procedures.

Before allowing high-speed, low-level airplane operations, the FAA evaluate the potential risk of increased bird strike hazards to air carrier turbo-jet airplanes.

With representatives from the U. S. Department of Agriculture, the Department of the Interior, the Department of Defense, and the U. S. Army Corps of engineers, the FAA convene a task force to establish a permanent bird strike working group to facilitate conflict resolution and improve communications between aviation safety agencies and wildlife conservation interests.

The U. S. Department of Agriculture participate in a task force, to be convened by the FAA, to establish a permanent bird strike working group to facilitate conflict resolution and improve communications between aviation safety agencies and wildlife conservation interests.

The U. S. Army Corps of Engineers participate in a task force, to be convened by the FAA, to establish a permanent bird strike working group to facilitate conflict resolution and improve communications between aviation safety agencies and wildlife conservation interests.

The U. S. Department of Defense participate in a task force, to be convened by the FAA, to establish a permanent bird strike working group to facilitate conflict resolution and improve communications between aviation safety agencies and wildlife conservation interests.

The U. S. Department of the Interior participate in a task force, to be convened by the FAA, to establish a permanent bird strike working group to facilitate conflict resolution and improve communications between aviation safety agencies and wildlife conservation interests.

USA Jet Airlines, Incorporated, estimated that the cost of repairs to the left engine (649193) from damage related to the bird strike was \$550,000. The cost to repair the right engine (654749) was \$60,000. The estimated sum total cost of repairs to the DC-9 airplane, N195US, tied directly to the bird strike was \$775,000.

Parties to the investigation were the Federal Aviation Administration Flight Standards District Office, Kansas City, Missouri, USA Jet Airlines, Incorporated, Belleville, Michigan, and Pratt and Whitney, Hartford, Connecticut.

The airplane and engines were released and returned to USA Jet Airlines, Incorporated.

Pilot Information

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|----------------------------------|--|-------------------------------|----------------------------|
| Certificate: | Airline Transport | Age: | 53, Male |
| Airplane Rating(s): | Multi-engine Land; Single-engine Land | Seat Occupied: | Left |
| Other Aircraft Rating(s): | None | Restraint Used: | Seatbelt, Shoulder harness |
| Instrument Rating(s): | Airplane | Second Pilot Present: | Yes |
| Instructor Rating(s): | None | Toxicology Performed: | No |
| Medical Certification: | Class 1 Valid Medical--w/ waivers/lim. | Last FAA Medical Exam: | 09/25/1998 |
| Occupational Pilot: | Last Flight Review or Equivalent: | | |
| Flight Time: | 16000 hours (Total, all aircraft), 10000 hours (Total, this make and model), 5000 hours (Pilot In Command, all aircraft), 150 hours (Last 90 days, all aircraft), 60 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft) | | |

Aircraft and Owner/Operator Information

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|-------------------------------|--------------------------------------|--------------------------------|--------------------|
| Aircraft Make: | Douglas | Registration: | N195US |
| Model/Series: | DC-9-15F DC-9-15F | Aircraft Category: | Airplane |
| Year of Manufacture: | | Amateur Built: | No |
| Airworthiness Certificate: | Transport | Serial Number: | 47017 |
| Landing Gear Type: | Retractable - Tricycle | Seats: | 5 |
| Date/Type of Last Inspection: | 02/04/1999, Continuous Airworthiness | Certified Max Gross Wt.: | 91700 lbs |
| Time Since Last Inspection: | 48 Hours | Engines: | 2 Turbo Jet |
| Airframe Total Time: | 2725 Hours | Engine Manufacturer: | P&W |
| ELT: | Not installed | Engine Model/Series: | JT8D-7B |
| Registered Owner: | USA JET AIRLINES, INC. | Rated Power: | 14000 lbs |
| Operator: | USA JET AIRLINES, INC. | Operating Certificate(s) Held: | Flag carrier (121) |
| Operator Does Business As: | USA JET AIRLINES, INC. | Operator Designator Code: | Y2PA |

Meteorological Information and Flight Plan

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|----------------------------------|-----------------------|--------------------------------------|------------------|
| Conditions at Accident Site: | Visual Conditions | Condition of Light: | Night/Dark |
| Observation Facility, Elevation: | MCI, 1026 ft msl | Distance from Accident Site: | 3 Nautical Miles |
| Observation Time: | 2153 CST | Direction from Accident Site: | 190° |
| Lowest Cloud Condition: | Unknown / 0 ft agl | Visibility | 10 Miles |
| Lowest Ceiling: | Broken / 9000 ft agl | Visibility (RVR): | 0 ft |
| Wind Speed/Gusts: | 8 knots / | Turbulence Type Forecast/Actual: | / |
| Wind Direction: | 150° | Turbulence Severity Forecast/Actual: | / |
| Altimeter Setting: | 29 inches Hg | Temperature/Dew Point: | 12° C / -3° C |
| Precipitation and Obscuration: | | | |
| Departure Point: | LOS ANGELES, CA (LAX) | Type of Flight Plan Filed: | IFR |
| Destination: | (MCI) | Type of Clearance: | IFR |
| Departure Time: | 1825 PST | Type of Airspace: | Class B |

Airport Information

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|----------------------|---------------------------------|---------------------------|------------------------|
| Airport: | KANSAS CITY INTERNATIONAL (MCI) | Runway Surface Type: | Concrete |
| Airport Elevation: | 1026 ft | Runway Surface Condition: | Dry |
| Runway Used: | 19R | IFR Approach: | Visual |
| Runway Length/Width: | 10801 ft / 150 ft | VFR Approach/Landing: | Full Stop; Straight-in |

Wreckage and Impact Information

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|---------------------|--------|----------------------|-------------|
| Crew Injuries: | 2 None | Aircraft Damage: | Substantial |
| Passenger Injuries: | N/A | Aircraft Fire: | None |
| Ground Injuries: | N/A | Aircraft Explosion: | None |
| Total Injuries: | 2 None | Latitude, Longitude: | |

Administrative Information

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|-----------------------------------|--|--------------|------------|
| Investigator In Charge (IIC): | DAVID C BOWLING | Report Date: | 01/10/2001 |
| Additional Participating Persons: | JERRY L MCCORMACK; KANSAS CITY, MO RENEE GREGORY; BELLEVILLE, MI MICHAEL L YOUNG; HARTFORD, CT | | |
| Publish Date: | | | |
| Investigation Docket: | NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ . | | |

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).